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### NOTES ON NORTH AMERICAN DROSOPHILIDAE WITH DESCRIPTIONS OF TWENTY-THREE NEW SPECIES.

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The writer has in preparation a comprehensive treatment of the North American species of *Drosophila* and closely related genera. This paper is not yet ready for publication; but there are several unnamed species that are being used as laboratory animals, so it has seemed advisable to put out a preliminary paper describing these and other new forms, and revising the names of a few additional species.

In the following descriptions there are a few terms that will need explanation. The "number of rows of acrostichal hairs" is to be counted just in front of the anterior pair of dorsocentral macrochætæ. The "costal index" is the number obtained by dividing the length of the second section of the costa by that of the third section; the "4th vein index" is obtained by dividing the length of the ultimate section of the fourth vein by that of the penultimate section; the "5x index" is obtained by dividing the length of the last section of the fifth vein by the length of the posterior cross-vein; the "4c index" is obtained by dividing the length of the third section of the costa by that of the penultimate section of the fourth vein. These indices are somewhat variable, but nevertheless are sufficiently characteristic to be valuable aids in classification. I hope later to publish some detailed data on their variability.

In the cases of four new species (*Drosophila virilis*, *robusta melanica*, and *modesta*) I have reared offspring from the individual selected as the type specimen. In these cases the mate, to which the type was bred, is designated allotype; and all descendants of the type are called *gonotypes*.

My studies have been greatly facilitated by loans of material and other favors received from Dr. F. E. Lutz, Messrs. C. W. Johnson and F. Knab, and Profs. J. M. Aldrich and A. L. Melander, and others. To them I wish to express my most sincere thanks.

The type specimens of the new species described here are in the following collections:

American Museum of Natural History, New York City:

*Drosophila ramsdeni*, *saltans*, *earlei*, *virilis*, *robusta*,  
*melanica*, *melanissima*, *affinis*, *caribea*, *cardini*, *modesta*,  
*putrida*, *floræ*, *lutzii*, *prognatha*, *quadrata*.

United States National Museum, Washington, D. C.:

*Drosophila sulcata*, *pseudomelanica*, *orbitalis*, *superba*,  
*projectans*.

A. L. Melander:

*Drosophila melanderi*.

J. M. Aldrich:

*Chymomyza aldrichii*.

Many paratypes are in the author's collection, in the four named above, and in other collections.

**Leucophenga** Mik. 1886. Wien. Ent. Zt. 317.

*Drosophila maculosa* Coq. 1895, Proc. Acad. Nat. Sci. Phila. XL, is a synonym of *L. quadrimaculata* Walk. 1856, Dipt. Saund. IV. The species will be easily recognized by its large flat yellow palpi. I have seen specimens from New York, District of Columbia, North Carolina, Florida, Cuba, Dominican Republic, Peru. These include Coquillett's type.

*Drosophila bimaculata* Lw. from Cuba, is a *Leucophenga*. I have examined Loew's specimen in the Museum of Comparative Zoology at Harvard, and two Cuban specimens in my own collection.

"*Leucophenga vittata* Coq." of Johnson, 1913, Bull. Am. Mus. Nat. Hist. XXXII. 88 is a *Scaptomyza*. (See below).

**Chymomyza** Czerny. 1903. Zts. Hymenopt. III.

This genus has not hitherto been reported from North America, but *Drosophila amæna* Lw. and *D. procnemis* Willist. both belong here. The genus is easily separable from *Drosophila* in that it has bare eyes; small postvertical bristles; second orbital small or missing; a fourth orbital, below the third, large, and reclinate; prominent male genitalia. The species are usually rather slender, often with pigmented wings, and have the habit of waving their wings. They are frequently found around bleeding trees, but *C. amæna* and *C. procnemis* will breed on fermenting fruit. *C. amæna* is frequently collected with the sweeping net, and is often very common around tomatoes and windfall apples. It is also often seen on windows. *C. procnemis* occurs from New York to Trinidad and Panama.

*C. caudatula* Oldenberg, 1914, Arch. Naturgesch. LXXX, A. Heft 2, 14, was described from Herkulesbad, in the southern Carpathians. Prof. Melander lent me two specimens, collected at Pullman and at Mt. Constitution, both in Washington. I have carefully compared these specimens with Oldenberg's very full description, and can find no significant difference, even in the external male genitalia. There is, so far as I am aware, no other record of the species.

The three species above, with the new one described below, may be separated by the following key:

1. Wings much spotted; front legs yellow.....*C. amæna* Loew.  
Wings clear, or blackish along anterior margin, or with a white tip; front  
femora, tibiæ, and first tarsal joints blackish.....2
2. Front dark opaque brown.....3  
Front yellow or reddish yellow.....*C. procnemis* Williston
3. Wings clear; face whitish.....*C. caudatula* Oldenberg  
Costal cell brown; face brown.....*C. aldrichii* n. sp.

**Chymomyza aldrichii**, n. sp.

♂. Arista with four branches above and two below. Antennæ reddish brown. Front nearly one-half width of head, wider above; reddish brown, orbits and triangle darker. Second orbital reduced to a minute hair, the other three approximately equal in size. Carina very small and confined to upper part of face. Face brown, somewhat concave. There is a row of bristles on the oral margin, the anterior one being slightly longer than the others. Cheeks yellow. Eyes bare.

Dorsum of thorax and scutellum shining dark reddish brown. Pleuræ brownish yellow. Coxæ and legs pale yellow, except as follows; fore femora and tibiæ dark brown, fore tarsi and hind tibiæ brownish yellow.

Abdomen shining black, hypopygium prominent.

Wings brownish on anterior margin, especially in costal cell. Costal index about 1.9, 4th vein index about 2.6, 5x index about 2.0, 4c index about 0.6.

Length of body  $2\frac{1}{4}$ mm., wings  $2\frac{1}{2}$ mm.

Type and 7 paratypes, collected at Potlatch, Ida., Sept. 9, 1912, on the windows of a sawmill (J. M. Aldrich). Also one specimen, Yale, Ida., Sept. 10, 1912 (Aldrich). The type and 5 paratypes have been returned to Prof. Aldrich.

**Scaptomyza** Hardy, 1849. Proc. Berwicksh. Nat. Club, 349.

This genus is easily recognized, in our American species, by the 2 or 4 acrostichal rows. The larvæ are not exclusively leaf miners, as I have bred *S. adusta* Lw. and *S. graminum* Fall. through several generations on tomato fruits and also on potato tubers.

Our species have been separated largely on the basis of the thoracic color and the presence or absence of the spot at the tip of the wings. Both characters are extremely unreliable, however, as neither the dark thorax nor the wing spot appears until a day or two after the adult emerges. The genus is easily divided into two groups on the basis of the number of rows of acrostichal hairs. *S. adusta* Lw. and *S. terminalis* Lw. have 4; *S. graminum* Fall. has 2.

*S. flaveola* Meig. probably does not occur in North America. Most specimens so labelled seem to be immature specimens of the three above named species. *S. vittata* Coq. 1895 Proc. Acad. Nat. Sci. Phila. 318, is perhaps a synonym of *S. graminum* Fall. Geomyz. 8. I have been unable to find the type specimen of *vittata*. There are some tropical species belonging to the two-rowed group, but I have not described them because of my uncertainty as to most of this genus.

*S. apicata* Thoms. 1868, Eug. Resa. 597, is probably a synonym of *S. terminalis* Lw. 1863, Berl. Ent. Zt. I have examined a very large series of this form from the Pacific Coast and from Canada and New England, including Loew's specimen. It is extremely variable in several characters (size, color, wing-markings) and there may well be several species involved. Some specimens are practically indistinguishable from *S. adusta* Lw.; but that species is not especially variable, and is

much lighter in color than most *S. terminalis*. I have seen specimens of *S. adusta* from Massachusetts, Alabama, Texas, Illinois and numerous intermediate states.

**Drosophila** Fall, 1823. Geomyz, 4.

The following new names are proposed, those now in use being preoccupied (homonyms).

**Drosophila annularis**, nom. nov. for **D. annulata** Willist. 1896. Trans. Ent. Soc. Lond. Not **Notiphila annulata** Fall. 1813. Vetensk. Akad. Hand.; **Drosophila annulata** Zett., 1847. Dipt. Scand. VI.

**Drosophila nebulosa**, nom. nov. for **D. limbata** Willist. 1896. Trans. Ent. Soc. Lond. Not **Drosophila limbata** v. Ros. 1840. Württ. Corubl. The species occurs in Porto Rico, Cuba, Dominican Republic, Barbadoes, Panama.

**Drosophila pulchella**, nom. nov. for **D. bellula** Willist. 1896. Trans. Ent. Soc. Lond. Not **Drosophila bellula** Bergr. 1894. Ent. Zt. Stett. LV.

**Drosophila willistoni**, nom. nov. for **D. pallida** Willist. 1896. Trans. Ent. Soc. Lond. Not **Drosophila pallida** Zett. 1847. Dipt. Scand. VI. This species is found in Florida (Miami), Cuba, Jamaica, Hayti, Porto Rico, Bahamas, British Honduras, Costa Rica, Panama and at Manaos, Brazil (?).

**Drosophila multipuncta**, Lw. 1866. Berl. Ent. Zt. X. is a synonym of **D. guttifera** Walk. 1849. List. Dipt. Ins. IV. I have examined the Loew specimen in the Museum of Comparative Zoology at Harvard, and a large series of more recent material from Massachusetts, New Jersey, North Carolina, Indiana, Alabama and Texas.

**Drosophila ornatipennis**, Willist. 1896. Trans. Ent. Soc. Lond. is a synonym of **D. calloptera** Schiner. 1868. Novara. I have examined Williston type material in the American Museum of Natural History, and specimens that I collected in Cuba.

"**Drosophila slossonæ** Coq." of Johnson. 1913. Bull. Am. Mus. Nat. Hist. XXXII. 88, is a manuscript name, and I have been unable to find any specimen bearing this label.

**Drosophila obscura** Fall., a common European species, occurs on the Pacific coast. I have examined specimens from Corvallis, Oregon, Claremont and Newport, California. These agree with European material determined by Bezzi and by de Meijere, and with the descriptions given by Schiner and by Oldenberg. The Japanese specimens referred to this species by Coquillett (1899. Proc. U. S. N. M. XXI. 301) are not very well preserved, but I am convinced that they belong to some other species.

***Drosophila ramsdeni*, n. sp.**

♀. Arista with 4 branches above and 2 below. Antennæ pale yellow, third joint reddish brown above. Front pale yellow, 3 brown spots on each orbit. and one around each ocellus. Second orbital one-fourth size of other two. Vibrissa three times size of other oral bristles. Carina large, broad, sulcate. Face and cheeks yellow, a brown spot just below carina; and one just below each eye. Eyes with black pile.

Eight acrostichal rows, no prescutellar bristles. Dorsum of thorax light gray, each hair and bristle arising from a dark brown spot. Between the dorsocentrals these spots are fused into a pair of irregular longitudinal stripes. Scutellum light gray, basal pair of bristles arising from brown spot. Pleuræ dark brown above, pale yellow below. Legs pale yellow, tips of femora and bases of tibiæ brown. Apical and preapical bristles on first two pairs of tibiæ, preapicals on third.

Abdomen yellow; each segment with a dark brown cross band, which is broadly broken in the median dorsal line.

Wings clear; veins pale brown, with dark brown spots at tip of first section of costa and at junction of first and second veins. Costal index about 2.6, fourth vein index about 2.0, 5x index about 1.2, 4c index about 1.1.

Length of body  $2\frac{1}{2}$ mm., wings  $2\frac{1}{2}$ mm.

Type and paratypes, from pineapple, sent from Guantanamo, Cuba, by Mr. Chas. T. Ramsden, Dec. 1913. The type itself was bred, from this stock, in New York City, Feb., 1914.

The males agree with the above description in all respects.

This species resembles *D. repleta* Woll., but is easily separated from it on the basis of its banded legs, lighter color, and more slender form.

*D. ramsdeni* is the "Species A" of Metz (1914, Journ. Exper. Zool. 17, p. 50).

***Drosophila saltans*, n. sp.**

♂. Arista with 5 branches above and 3 below. Antennæ brown, third joint darker. Front over one-third width of head, wider above; reddish brown, triangle and orbits grayish pollinose, with a brown spot above upper orbital bristle. Second orbital one-fifth other two. Second oral bristle nearly as long as first. Carina high and narrow. Face brown, proboscis brownish. Cheeks yellowish brown, their greatest width scarcely one-sixth greatest diameter of eyes. Eyes with short sparse dark pile.

Acrostichal hairs in six rows; no prescutellars. Dorsum of thorax grayish brown pollinose, with markings of dark dull brown as follows: a pair of short longitudinal stripes on the front margin, just within the dorso-central row of hairs; two pairs of spots just outside the dorso-central row, one just behind the humeri and the other just behind the transverse suture. Scutellum grayish brown pollinose. Pleuræ dark

brown, grayish at the sutures. Legs pale brown, femora and tibiæ darker in the middle. Apical and preapical bristles on first and second tibiæ, preapicals on third.

Abdomen dark brown, each segment grayish pollinose anteriorly.

Wings with a small blackish speck at tip of first vein. Costal index about 2.0; 4th vein index about 2.6; 5x index about 1.7; 4c index about 1.4. Length of body  $1\frac{1}{2}$ mm., wings  $1\frac{3}{4}$ mm.

Type and ten paratypes, from stock bred in New York City, from a pineapple sent from Guantanamo, Cuba, by Mr. Chas. T. Ramsden. Four specimens from Panama, R. P., differ only in that the dorsum of the thorax is lighter, and may be referred to this species.

The name *saltans* is given because the larvæ (like those of *D. cardini*, n. sp.), have the habit of "skipping" as do those of *Piophila casei* Linn. and by the same mechanism.

The species may be recognized by its thoracic pattern, small size and 6 acrostichal rows.

***Drosophila earlei*, n. sp.**

♂. Arista with five branches above and two below. Antennæ brown, third joint dark. Front over one-third width of head, wider above; opaque reddish brown, orbits and triangle grayish pollinose. Second orbital one-third other two. Second oral bristle nearly as long as first. Carina high and narrow; face brown. Cheeks yellowish brown; their greatest width about one-sixth greatest diameter of eyes.

Acrostichal hairs somewhat irregular, in six to eight rows; no prescutellars. Dorsum of thorax coffee brown, with yellow-brown markings as follows: a narrow median longitudinal streak, a pair of stripes including the dorsocentrals and broader anteriorly with external branches behind, a spot on each humerus. Scutellum coffee brown, with yellowish lateral edges. Pleuræ coffee-brown; legs pale brown. First and second tibiæ with apical and preapical bristles, third with preapicals.

Abdomen black, four basal segments, each with an interrupted yellowish anterior band.

Wings clear, veins brown. Costal index about 2.0; 4th vein index about 1.7; 5x index about 1.3; 4c index about 0.9.

Length of body  $1\frac{3}{4}$ mm., wings 2mm.

Type and two paratypes, Herradura, Cuba, January 28, 1915 (C. W. Metz). Other specimens are before me from Cristo, Cuba, and Panama, R. P. The females agree with the description given above. This species is named after Prof. F. S. Earle, on whose plantation the type material was collected.

This species will be most easily confused with *D. saltans* n. sp. It differs in its larger size, yellow markings on abdomen, thoracic pattern, and smaller 4th vein index.



***Drosophila sulcata*, n. sp.**

♂. Arista with five branches above and two below. Antennæ reddish brown, third joint dark. Front over one-third width of head, reddish brown, with a dark brown ocellar dot. Second orbital about one-fourth other two. Second oral bristle not quite one-half first. Three large bristles on each palpus. Carina prominent, not very broad, distinctly sulcate. Face reddish brown. Cheeks reddish brown; their greatest width about one-fifth greatest diameter of eyes. Eyes with rather short sparse pile.

Acrostichal hairs in six rows; no prescutellar bristles. Dorsum of thorax grayish pollinose, with somewhat indefinite and variable reddish brown interrupted stripes. Scutellum grayish pollinose. Pleuræ grayish pollinose, reddish brown below. Legs, including coxæ, pale reddish brown. Apical and preapical bristles on first and second tibiæ, preapicals on third.

Abdomen grayish, with a dark brown fascia on each side of each segment, leaving usually only a median dorsal and a posterior gray line.

Wings slightly yellowish, veins brown. Costal index about 4.6; 4th vein index about 1.3; 5x index about 0.9; 4c index about 0.7.

Length of body 3mm., wings  $3\frac{1}{4}$ mm.

Type and 8 paratypes collected at Cabin John Bridge, Md., April 1914, (3 at sap), by R. C. Shannon (U. S. N. M.). Other specimens have been examined as follows: Dead Run, Fairfax County, and Glencarlyn, Va.; Linnieville, Md.; D. C.; Ottawa, Can.; Pottstown, North Mt., Pa.; Chester, Mass.; Franconia, Hanover, and Bretton Woods, N. H.; Ga.

The females agree with the above description, but the thoracic color is variable in both sexes and is easily obscured in imperfect specimens.

The clearly sulcate carina, large size, six acrostichal rows, and grayish thorax will serve to distinguish this species from any others known to me.

***Drosophila virilis*, n. sp.**

♂. Arista with five branches above and two below. Antennæ brown, third joint dark opaque reddish brown. Front over one-third width of head, wider above; dull coffee brown, ocellar dot black. Second orbital one-third size of other two. Second oral bristle three quarters length of first. Only one long bristle on each palpus. Carina broad, slightly sulcate, nose-like. Face somewhat shiny brown. Width of cheek over one-fourth greatest diameter of eye. Cheeks yellowish brown.

Six acrostichal rows; no prescutellars. Dorsum of thorax and scutellum dark dull brown. Pleuræ and abdomen dull brown, somewhat darker. Legs brown, paler than thorax; no combs on first tarsal joints; preapicals on all tibiæ, apicals on the first two pairs.



Wings clear, veins brown. Costal index about 3.0, 4th vein index about 1.8, 5x index about 1.2, 4c index about 0.9.

Length body  $2\frac{3}{4}$ mm., wings 3mm.

Type, allotype and gonotypes from New York, N. Y. The type and allotype were bred from a pineapple exposed at Columbia University; they and their descendants are the only specimens of the species that I have seen. The females agree with the above description.

This is the "species B" of Metz (1914 Journ. Exper. Zool. 17, p. 50; 1915. Am. Nat. 49, p. 187). It is a fruit eating form, and has been kept in the laboratory more than two years, banana being used for food.

The species resembles *D. robusta* n. sp. and *D. melanica* n. sp. rather closely. The six acrostichal rows will separate it from most specimens of *D. robusta*; and from both these species it may be distinguished by its broad cheeks and relatively long second oral bristle.

#### ***Drosophila robusta*, n. sp.**

♂. Arista with six branches above and three below. Antennæ dark brown, second joint pollinose distally. Front over one-third width of head; dark coffee brown, orbits and triangle slightly grayish pollinose. Second orbital fine, about one-fourth length of other two. Second oral bristle not quite one-half size of vibrissa. More than one prominent bristle on each palpus. Carina broad, very slightly sulcate. Face somewhat shining, brown. Cheeks brown, their greatest width scarcely one-sixth greatest diameter of eyes. Eyes with short black pile.

Acrostichal hairs somewhat irregular, in six to eight rows; no prescutellar bristles. Dorsum of thorax dark dull brown, with four faint pollinose longitudinal stripes. Scutellum and pleuræ dark dull brown. Legs pale brown; fore coxæ blackish brown beneath, with a whitish pollinose spot between them. Apical and preapical bristles on first and second tibiæ, preapicals on third.

Abdomen grayish brown, each segment with a very broad dark brown fascia on each side; these fasciæ often nearly or quite meet in the middorsal line.

Wings clear; veins brown, subterminal part of first vein very dark. Costal index about 4.0, 4th vein index about 1.6, 5x index about 1.2, 4c index about 0.7.

Length body  $2\frac{1}{2}$ mm., wings  $2\frac{3}{4}$ mm.

Type, allotype and numerous gonotypes, bred in New York, N. Y., from stock obtained at Kushla, Alabama. I have examined specimens of this species from Woods Hole, Mass.,

Cold Spring Harbor, Long Island, and Ithaca, N. Y., Cabin John Bridge, Md., Falls Church, Va. and Helena, Ark.

The females agree with the description given above; but both sexes vary somewhat in the color of the thorax, and many specimens have the posterior cross-vein distinctly clouded.

*Drosophila robusta* is a fruit eating form, living on banana in the laboratory. I have specimens bred from potato in Massachusetts.

This species resembles *D. virilis*, n. sp. and *D. melanica*, n. sp. Its oral and palpal bristles and narrow cheeks will separate it from the former. It differs from *D. melanica* in its larger size, black fore coxæ, and darker abdomen.

***Drosophila melanica*, n. sp.**

♂. Arista with four branches above and two below. Antennæ dark brown, second joint grayish above. Front over one-third width of head, wider above; blackish, velvety, orbits and narrow triangle brown. Second orbital about one-third size of other two. Second oral bristle less than one-fourth vibrissa. Carina broad, slightly sulcate. Face blackish brown, dull. Several prominent palpal bristles. Cheeks brown; their greatest width about one-sixth greatest diameter of eyes. Eyes with short thick black pile.

Acrostichal hairs long, in six rows; no prescutellar bristles. Dorsum of thorax dull blackish brown, a small indistinct pair of brown spots on anterior margin, just inside of dorsocentral lines. Humeri grayish brown. Scutellum and pleuræ dark dull blackish brown. Legs, including coxæ, pale brown. Apicals and preapicals on first and second tibiæ, preapicals on third.

Abdomen yellow, with a pair of lateral dark brown fasciæ on each segment.

Wings clear, veins brown. Costal index about 3.8; 4th vein index about 1.4; 5x index about 1.0; 4c index about 0.8.

Length of body 2mm., wings  $2\frac{1}{4}$ mm.

Type, allotype and numerous gonotypes, bred at New York, N. Y., from stock collected at Kushla, Alabama, April, 1915. I have examined specimens from Woods Hole and Plymouth, Mass.; Macon, Ga.; St. Louis, Mo.; Kingston, R. I.; Plummer's Island and vicinity, Md.; Dead Run, Va.; North Carolina; Mt. Washington, N. H.; Helena, Ark.

Typical females agree with the above description. Some specimens of both sexes, especially the northern ones, are somewhat lighter in color; but this is perhaps an accidental age difference.

The species resembles *D. virilis*, n. sp., *D. robusta*, n. sp., and *D. affinis*, n. sp. The narrow cheeks and small second oral bristles distinguish it from *D. virilis*; the small size, brown fore coxæ and yellow markings on abdomen from *D. robusta*; absence of combs on male tarsi, broad carina and darker thorax from *D. affinis*. The features that distinguish *D. melanica* from *D. melanissima*, n. sp. and *D. pseudomelanica*, n. sp. are discussed under those species.

*D. melanica* is the "species C" of Metz. (1914, Journ. Exper. Zool. 17, p. 52).

***Drosophila melanissima*, n. sp.**

♂. Arista with four branches above and two below. Antennæ velvety black. Front about one-half width of head, wider above; blackish brown, velvety. Second orbital about one-third other two. Second oral bristle less than one-fourth vibrissa. Carina broad, slightly sulcate below. Face black. Several prominent palpal bristles. Cheeks brownish black; their greatest width about one-third greatest diameter of eyes. Eyes with short thick black pile.

Acrostichal hairs long, in six rows; no prescutellars. Dorsum of thorax, scutellum and pleuræ brownish black; there is a faint grayish pollinose line extending from the base of the fore coxa to the base of the halter. Legs blackish brown; apical and preapical bristles on first and second tibiæ, preapicals on third.

Abdomen dark blackish brown, slightly polished.

Wings slightly brownish, veins brown. Costal index about 4.0; 4th vein index about 1.7; 5x index about 1.1; 4c index about 0.7.

Length of body 2mm., wings  $2\frac{1}{4}$ mm.

Type collected at Kushla, Alabama, June 22, 1914. In the U. S. National Museum are specimens from Biscayne Bay, Florida, Georgia, and North Carolina. The females among these agree with the above description.

This species is very similar to *D. melanica*, n. sp., and might be considered a color variety of it but for the smaller eyes, broader cheeks and larger oral opening. In color it is decidedly darker than *D. melanica*.

***Drosophila pseudomelanica*, n. sp.**

♂. Arista with five branches above and three below. Antennæ brown. Front about one-third width of head, wider above; brownish red. Second orbital scarcely more than a hair. Second oral bristle two-thirds size of first. Carina flat, rather narrow. Face narrow, brown. Palpi brown, with several prominent bristles. Cheeks brown; their greatest width about one sixth greatest diameter of eyes. Eyes with short pile.

Acrostichal hairs in six rows; no prescutellars. Dorsum of thorax and scutellum dull blackish brown; pleuræ brown. Legs pale yellowish brown; apical and preapical bristles on first and second tibiæ, only preapicals on third.

Abdomen shining dark brown, basal segments with lighter median dorsal and anterior lines.

Wings clear, veins brown. Costal index about 4.0; 4th vein index about 1.8; 5x index about 1.3; 4c index about 0.7.

Length of body  $1\frac{1}{2}$ mm., wings  $1\frac{3}{4}$ mm.

Type and two paratypes. Dead Run, Fairfax County, Va., April, 1914 (R. C. Shannon). One specimen, Cabin John Bridge, Md., March, 1914. (Shannon).

This species may be distinguished from *D. melanica*, n. sp. and the other members of its group by the two large oral bristles, narrow face and front and small size.

#### ***Drosophila affinis*, n. sp.**

♂. Arista with five branches above and two below. Antennæ brown, third joint nearly black. Front nearly one-half width of head, wider above; dark brown, lighter below, orbits and triangle pollinose. Second orbital three-fourths third, which is three-fourths first. Carina low, very narrow above; face dull brown. Second oral bristle scarcely one-fifth first. Cheeks grayish brown, their greatest width about one-sixth height of eyes. Eyes with short pile.

Acrostichal hairs in six rows; no prescutellars. Dorsum of thorax, scutellum, and pleuræ coffee brown. Legs pale brownish yellow. Apical and preapical bristles on first and second tibiæ, preapicals on third. A comb-like row of black bristles on the inner anterior surface of the first tarsal joint of each front leg, as in the male of *D. melanogaster* Meig.

Abdomen very dark brown, lighter toward the base.

Wings clear. Costal index about 3.6; 4th vein index about 2.6; 5x index about 2.0; 4c index about 1.2.

Length body 2mm., wings  $2\frac{1}{4}$ mm.

Type bred from banana, Kushla, Alabama, April 25, 1915. Twelve paratypes, Kushla, Alabama. The females agree with the above description, except that they have no combs on the first tarsi. I have examined numerous specimens from the United States, the following states being represented: Massachusetts, New York, New Jersey, Indiana, Alabama, Texas, Illinois, Pennsylvania, Missouri, Oklahoma, New Hampshire, District of Columbia, Maryland, Georgia, North Carolina and Virginia.

The species may be separated from *D. melanogaster* Meig. on the basis of its color and its six acrostichal rows (*D. melanogaster* has eight). *D. obscura* Fall. also has eight rows and has combs on the second tarsal joints of the front legs of the male, as well as on the first. The females may be confused with *D. melanica*, n. sp., but the narrow carina will serve to identify them as *D. affinis*. Most of the material that has passed as *D. confusa* Staeg. in this country belongs to *D. affinis*.

***Drosophila caribea*, n. sp.**

♂. Arista with five branches above and three below. Antennæ yellow, third joint brownish. Front nearly one-half width of head, wider above; reddish yellow. Second orbital about one-third other two. First oral bristle one and one-half times second. Carina rather broad, flat. Face, cheeks and proboscis yellow. Greatest width of cheeks less than one-sixth greatest diameter of eyes. Eyes thickly set with short yellow pile.

Acrostichal hairs in eight rows; no prescutellar bristles, although there is a transverse row of about four slightly enlarged hairs between the posterior pair of dorsocentrals. Dorsum of thorax, scutellum and pleuræ dull reddish yellow. Legs pale yellow. Apical and preapical bristles on first and second tibiæ, preapicals on third.

Abdomen brownish yellow, each segment with an indistinct dark brown posterior margin.

Wings clear. Costal index about 1.5; 4th vein index about 2.4; 5x index about 2.0; 4c index about 1.6.

Length body about 2mm., wings  $2\frac{1}{4}$ mm.

Type and eleven paratypes, Havana, Cuba, 1915. Other specimens have been examined from Santiago de Cuba, Santiago de las Vegas, Guantanamo, Herradura, Baracoa, Cuba; Sanchez, R. Dom.; Mayaguez, P. R.; Antigua; Roseau, Dominica; Manaos, Brazil; Panama, R. P.; San Jose, Costa Rica; Punta Gorda, Br. Honduras. This form is quite common in Cuba and Central America, about fruit, on which it breeds. It is also attracted to excrement.

The species is similar to *Drosophila melanogaster* Meig., but it may be recognized by the absence of tarsal combs in the male, paler abdomen, and higher costal and 4c indices. From *D. willistoni* nom. nov. it may be distinguished by the eight acrostichal rows (*D. willistoni* has only six), duller color and stouter shape.

**Drosophila orbitalis**, n. sp.

♂. Arista with five branches above and three below. Antennæ yellow. Front slightly over one-third width of head, wider above; yellow brown, orbits grayish. Orbitals, as well as other frontal bristles, small; second nearly as large as other two, situated half way between them. Carina prominent, narrow, not sulcate. Face grayish yellow. Only one prominent oral bristle. Cheeks yellow, their greatest width about one-eighth greatest diameter of eyes. Eyes clothed with short pale pile.

Acrostichal hairs in eight rows; no prescutellars. Dorsum of thorax and scutellum polished reddish yellow. Pleuræ and legs yellow. Apical and preapical bristles on first and second tibiæ, preapicals on third.

Abdomen black; terminal segments yellow brown on anterior outer corners.

Wings clear; costal index about 2.6; 4th vein index about 1.3; 5x index about 1.0; 4c index about 0.8. Third and fourth veins slightly convergent.

Length body 2mm., wings  $2\frac{1}{4}$ mm.

Type and paratype, Taboga Island, Panama, July, 1907. (Aug. Busck). U. S. Nat. Museum Collection.

The short, subequal, widely separated orbitals will distinguish this species from *D. melanogaster* Meig. and *D. caribea* n. sp., which resemble it rather closely.

**Drosophila cardini**, n. sp.

♂. Arista with five branches above and two below. Antennæ yellow, third joint brown. Front over one-third width of head, wider above; reddish yellow, orbits grayish. Second orbital about one-fifth other two. Carina broad and flat. Face brownish yellow, somewhat polished. Two prominent oral bristles, nearly equal. Cheeks yellow, their greatest width about one-fifth the greatest diameter of the eyes. Eyes clothed with short pale pile.

Acrostichal hairs in six rows; no prescutellars. Dorsum of thorax, scutellum and pleuræ shining reddish brown. Legs yellow; apical and preapical bristles on first and second tibiæ, preapicals on third.

Abdomen shining black; three basal segments with anterior bands of reddish brown, which do not reach the lateral margin.

Wings with small brownish clouds on each cross vein. Costal index about 3.9; 4th vein index about 1.7; 5x index about 1.0; 4c index about 0.9.

Length body  $2\frac{1}{2}$ mm., wings  $2\frac{1}{2}$ mm.

Type and twenty paratypes, Havana, Cuba, 1915. Specimens are before me from Santiago de las Vegas, Aguada Pasajeros, Herradura, Cristo, Cuba; Sanchez, R. Dom.; Mayaguez, Arecibo, Jayuya, Adjuntas, P. R.; Dominica, W. I.; San Jose,

Port Limon, Costa Rica; Panama, R. P.; Miami, Fla. The species is named for Sr. Patricio Cardin, of the Estacion Agromonico, Santiago de las Vegas, Cuba, through whose kindness Dr. C. W. Metz and I were enabled to collect some of the material of this and other species.

This species is quite variable in color, especially in the female sex. Many specimens are quite pale, and have little black on the abdomen. Dr. C. W. Metz and I have bred several stocks through many generations and have found these variations not to be inherited. They are, however, likely to cause confusion, since these pale females are practically indistinguishable from females of *D. similis* Willist. These two forms are quite distinct, as breeding experiments have shown, and we have been unable to cross them, but it is safest not to identify females as *D. similis* unless they have been bred, or the males are known.

Ordinarily the peculiar shining reddish brown thorax and shining black markings on the abdomen, together with the clouded cross veins, will serve to distinguish *D. cardini*.

I have found this species very common about fruit, on which it breeds, in Cuba and Central America. It is not at all rare in southern Florida.

#### *Drosophila melanderi*, n. sp.

♀. Arista with five short branches above and one below. Antennæ yellow, third joint red-brown. Front nearly one-half width of head, reddish yellow, triangle brown. Second orbital about one-fifth other two. One bristle and numerous hairs on oral margin. Carina low, flat and narrow. Face yellow. Cheeks yellow; their greatest width about one-fourth greatest diameter of eyes. Eyes with fine pale pile.

Acrostichal hairs in six rows; no prescutellars. Dorsum of thorax and scutellum somewhat shining reddish yellow. Pleuræ reddish yellow. Legs yellow. Apical and preapical bristles on first and second tibiæ, preapicals on third.

Abdomen dull yellow, each of first four segments with an interrupted posterior dark brown band.

Wings clear, veins brown. Costal index about 3.0; 4th vein index about 1.3; 5x index about 1.1; 4c index about 0.7.

Length body  $2\frac{1}{2}$ mm., wings 3mm.

Type and one paratype, Tacoma, Washington, August 27, 1911 (A. L. Melander). One specimen, Mt. Constitution, Washington. The type is in Professor Melander's collection.



This species resembles the European *D. fenestrarum* Fall., but the acrostichal rows and abdominal pattern are sufficient to show that it is different. Among our American species it will be most readily confused with *D. transversa* Fall. and similar species. The clear wings, single oral bristle, short arisal branches and slender body and wings will serve to identify it.

***Drosophila modesta*, n. sp.**

♂. Arista with about six branches above and three below. Antennae pale brown, third joint dark. Front over one-third width of head, wider above; opaque yellow. Second orbital about one-fifth other two. Second oral bristle nearly as long as first. Carina broad, flat; face brownish yellow. Cheeks yellow; their greatest width scarcely equal to one-sixth greatest diameter of eyes. Eyes with yellow pile.

Six rows of acrostichal hairs; no prescutellar bristles. Dorsum of thorax dark dull yellowish brown. Pleurae and legs pale yellowish brown. Apical and preapical bristles on first and second tibiae, preapicals on third.

Abdomen shining yellow; an interrupted dark brown band on the posterior margin of each of the first four segments, and a median anterior dark brown spot on the third, fourth and fifth segments.

Wings with faint clouds on each cross vein and at the tips of second and third veins; veins dark brown. Costal index about 4.3; 4th vein index about 1.7; 5x index about 1.3; 4c index about 0.7.

Length body  $2\frac{1}{2}$ mm., wings  $2\frac{3}{4}$ mm.

Type, allotype and gonotypes bred in New York, N. Y., from stock collected at Kushla, Alabama, April, 1915. I have also examined specimens from New Orleans, La.; Richmond, Arlington, Rosslyn, Dead Run, Va.; Plummer's Island, Md.; Bloomington, Ind.; New York, N. Y. The last specimens were bred from cabbage in November, and I am inclined to suspect were imported with the cabbage. I have also bred the species from banana, grape sap, agaric, and watermelon. The females agree in all respects with the description given above.

This species is similar to *D. tripunctata* Lw., but differs in its abdominal markings, and also in having six acrostichal rows, for *D. tripunctata* has eight. From *D. putrida* n. sp. it is easily separated by the absence of presutural acrostichal bristles; and from *D. transversa* Fall., by its two large oral bristles. The abdominal pattern and dull thorax will distinguish it from *D. quinaria* Lw.

***Drosophila putrida*, n. sp.**

♂. Arista with five or six branches above and two below. Antennæ yellow brown, third joint dark reddish brown. Front nearly one-third width of head, wider above; yellow brown, dull; ocellar dot darker. Second orbital minute. Second oral bristle nearly as long as first. Carina low, rather broad, flat; face yellow brown, somewhat shiny. Cheeks yellow, about one-eighth as wide as greatest diameter of eyes. Eyes with fine light yellow pile.

Six acrostichal rows; no prescutellar bristles; a pair of presutural bristles in the acrostichal rows next to the outer ones. Dorsum of thorax and scutellum shining yellow. Pleuræ and legs pale yellow. Apical and preapical bristles on first and second tibiæ, preapicals on third.

Abdomen pale yellow, each segment with a brown band on posterior margin, interrupted in the median dorsal line.

Wings clear. Costal index about 2.8; 4th vein index about 1.6; 5x index about 1.2; 4c index about 0.8.

Length body 1 mm., wings 2 mm.

Type and paratypes, Woods Hole, Mass. Specimens examined from Vermont, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Illinois, Virginia, North Carolina, Georgia, Alabama and Mississippi. The female agrees with the above description. The species is very common on fungi, in which it breeds.

Easily distinguished from all other members of the genus known to me by the presence of the presutural acrostichal pair of bristles. Some specimens are more brownish than the type.

***Drosophila floræ*, n. sp.**

♂. Arista with four branches above and three below. Antennæ dull brown, third joint darker. Front about one-third width of head, wider above; dull yellowish brown. Second orbital one-half other two. Second oral bristle about one-third first. Carina broad, flat; face dull yellow brown. Cheeks yellow; their greatest width about one-eighth greatest diameter of eyes. Eyes with fine black pile.

Eight acrostichal rows; prescutellars well developed. Dorsum of thorax, scutellum and pleuræ dull brown. Legs pale brown; apical and preapical bristles on first and second tibiæ, preapicals on third.

Abdomen dark brown, basal segment with a yellowish brown transverse band.

Wings clear; costal index about 2.5; 4th vein index about 1.8; 5x index about 1.4; 4c index about 1.0.

Length body  $2\frac{1}{4}$  mm., wings  $2\frac{1}{2}$  mm.

Type and paratypes, Havana, Cuba, January and February, 1915. Specimens have been examined from Guareiras, Cuba;

Naguabo, Porto Rico; San Jose, Costa Rica. The females agree in all respects with the above description. The species is usually found in flowers of *Datura*, melons, etc. on the decaying petals of which it breeds.

The well developed prescutellar bristles, clear wings and dull brown color will be sufficient to distinguish this species from any others known to me.

***Drosophila lutzii*, n. sp.**

♂. Arista with four short branches above and two below. Antennæ yellow brown. Front over one-third width of head, wider above; opaque dark brown, orbits and triangle polished. Second orbital about one-fourth other two. Only one large oral bristle. Carina rather broad, flat, edges sharply angled; face brown. Cheeks brown, their greatest width about one-fifth height of eyes. Eyes with short sparse pile.

Six rows of acrostichal hairs; no prescutellar bristles. Dorsum of thorax, scutellum and pleuræ dark reddish brown, somewhat polished. Legs pale yellowish brown, femora somewhat darker. Apical and pre-apical bristles on first and second tibiæ, preapicals on third.

Abdomen yellowish brown, lighter towards tip.

Wings clear, veins yellowish. Costal index about 2.1; 4th vein index about 1.7; 5x index about 1.3; 4c index about 1.1.

Length body  $1\frac{3}{4}$  mm., wings  $1\frac{1}{2}$  mm.

Type and four paratypes (♂ and ♀), collected at Havana, Cuba, January, February, 1915. The species is very common in many parts of tropical America. I have examined specimens from Guane, Cristo, Havana, Aguada Pasajeros, Guareiras and Guantanamo, Cuba; Hope Gardens, Jamaica; Naguabo, Mayaguez and Adjuntas, Porto Rico; Port Limon, Costa Rica; Biscayne Bay, Key West, and Miami, Florida. It is found in flowers, especially those of *Datura*, and breeds on the decaying petals. The female agrees with the above description of the male.

The species will be easily known by its small size, shining reddish brown color and short bristles.

***Drosophila prognatha*, n. sp.**

♂. Arista with six branches above and two below. Antennæ yellow, third joint very long and covered with yellow hairs. Front over one-third width of head, dull yellow, ocellar dot brown. Second orbital one-fourth other two. Vibrissæ long, other oral bristles short. Proboscis prominent and projecting forward; carina short, low, narrow and confined to upper part of face. Face dull yellow. Width of

cheeks about one-sixth greatest diameter of eyes. Cheeks yellow, a brown spot on each side, just above and behind vibrissa. Eyes with yellow pile.

Six acrostichal rows; no prescutellars. Dorsum of thorax dull reddish yellow, with a pair of darker indistinct longitudinal stripes and dark areas on and behind the humeri. Scutellum reddish yellow. Pleuræ pale yellow, a reddish line running forward from base of wing; darker above this line. Legs pale yellow. Preapical bristles only on third tibiæ, apicals only on second.

Abdomen dull reddish yellow, with posterior black bands on first four segments.

Wings clear. Costal index about 1.9; 4th vein index about 2.0; 5x index about 1.8; 4c index about 1.4.

Length body 2mm., wings 2mm.

Type and ten paratypes, Adjuntas, P. R., June 8-13, 1915 (Lutz and Mutchler). Two specimens, San Francisco Mts., San Domingo, (Busck). The females agree with the above description. Some specimens are a little smaller and have the dark marks on front, thorax and abdomen practically invisible. There are intermediate specimens, and I suppose that the difference is due to age.

The species is distinct from other described species in the color of the thorax. Its most unusual peculiarity is the fewness of the apical and preapical bristles, in which it resembles *D. quadrata* n. sp. The large hairy third antennal joint is also noteworthy.

### ***Drosophila quadrata*, n. sp.**

♂. Arista with six branches above and three below. Antennæ brown. Front one-half width of head, wider above; pale yellow. Second orbital not distinguishable from neighboring hairs. One large vibrissa, other oral bristles reduced practically to hairs. Carina low and narrow, face broad and excavated on each side of it; face yellow. Proboscis yellow, palpi dark brown. Cheeks yellow, their greatest width about one-fifth greatest diameter of eyes. Eyes with yellow pile.

Eight rows of acrostichal hairs; no prescutellars; the anterior dorso-central bristles are only a little behind the suture. Dorsum of thorax, scutellum, pleuræ and legs dull brownish yellow. There is a dark brown stripe on the pleura extending as a straight band from just under the haltere almost to the neck. Below this stripe the pleura is paler. Apical bristles only on the second tibiæ, preapicals only on the third.

Abdomen yellow, each segment with a dark brown posterior margin.

Wings clear; costal index about 1.0; 4th vein index about 5.5; 5x index about 6.0; 4c index about 5.0.

Length body 1¾mm., wings 2mm.

Type and three paratypes, Kushla, Alabama, April, 1915. Also one specimen, Tifton, Ga., October, 1896. (Coll. A. L. Melander).

This species is most like *D. prognatha*, n. sp. which it resembles in its few tibial bristles, in the presence of the pleural stripe, etc. The third joint of the antennæ is here small and dark, while in *D. prognatha* it is large and yellow; and the extraordinary wing vein indices of *D. quadrata* will serve to distinguish it from most other species of the genus.

***Drosophila superba*, n. sp.**

♀. Arista with eight branches above and four below. Antennæ brown, third joint dark. Front about one-third width of head, wider above; yellow. Second orbital scarcely more than a hair. Only one prominent oral bristle. Carina low and narrow, confined to upper part of face. Face yellow. Cheeks yellow, their greatest width scarcely one-sixth greatest diameter of eyes. Eyes sparsely clothed with very short, fine, pale pile.

Acrostichal hairs is about ten rows; no prescutellars; a single pair of dorsocentrals. Dorsum of thorax yellow, with two pairs of interrupted brownish longitudinal stripes, the median pair broader than the outer. Scutellum brownish yellow; pleuræ yellow, with two longitudinal dark reddish brown stripes. Legs yellow. Apical and preapical bristles on first and second tibiæ, preapicals on third.

Abdomen dark brown, yellow at base.

Wings brownish black, with four hyaline areas; one at the base; one including the apical part of the costal cell and extending to the anal cell; a band extending directly across the wing about its middle, between the two cross veins; a spot reaching from the middle of the first posterior cell to the wing margin in the second posterior cell. Costal index about 3.0; 4th vein index about 1.0; 5x index about 1.0; 4c index about 0.7.

Length body 3mm., wings  $3\frac{1}{4}$ mm.

Type, Cacao, Trece Aguas, Alta Vera Paz, Gautemala (Schwarz and Barber). U. S. N. M. collection.

The color of the wings and pleuræ and the single pair of dorsocentrals will serve to distinguish this species.

***Drosophila projectans*, n. sp.**

♂. Arista with five branches above and one below. Antennæ brown. Front one-third width of head, broader above, velvety black, brownish below, with a silvery whitish reflection, small triangle and orbits polished. Second orbital minute. Second oral bristle quite small. Carina high, narrow; face brown. Clypeus prominent. Proboscis and palpi pale yellow. Cheeks yellow, their greatest width about one-sixth the greatest diameter of eyes. Eyes bare.

Dorsum of thorax strongly convex; a single pair of dorso-central bristles and no prescutellars. Acrostichal hairs in six rows. Dorsum of thorax, scutellum, and pleuræ above wings shining blue black. Pleuræ below wings, and legs, pale yellow. Apical bristles on second tibiæ, preapicals on third.

Abdomen shining black. First segment with one median and two small lateral yellow spots; second segment with a median one, third with an anterior yellow band.

Wings black just beyond the base, a black oblique band from the apex of the costal cell to the apex of the anal cell, tip of second vein darkened. The apical portion of the costal cell is drawn out into a rounded process, extending beyond the rest of the anterior margin of the wing. Costal index about 1.1; 4th vein index about 2.2; 5x index about 2.0; 4c index about 1.9.

Length body  $1\frac{1}{2}$ mm., wings  $1\frac{1}{2}$ mm.

Type, San Francisco Mts., St. Domingo, 4. 9. 05, (A Busck) U. S. N. M. collection. A headless specimen from Montserrat, Trinidad, W. I. (A. Busck) agrees.

This species belongs to the same group as *D. dimidiata* Lw. and *D. thoracis* Willist. The projecting costal cell, low costal index and spotted wings will serve to distinguish it from those species.